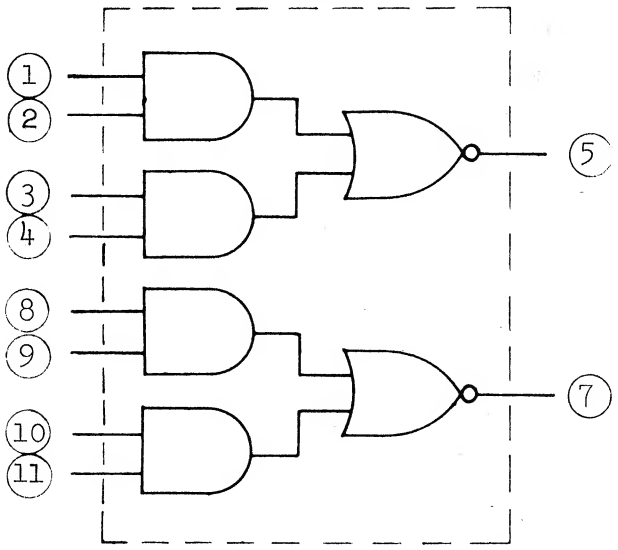
August 1964

DESCRIPTION

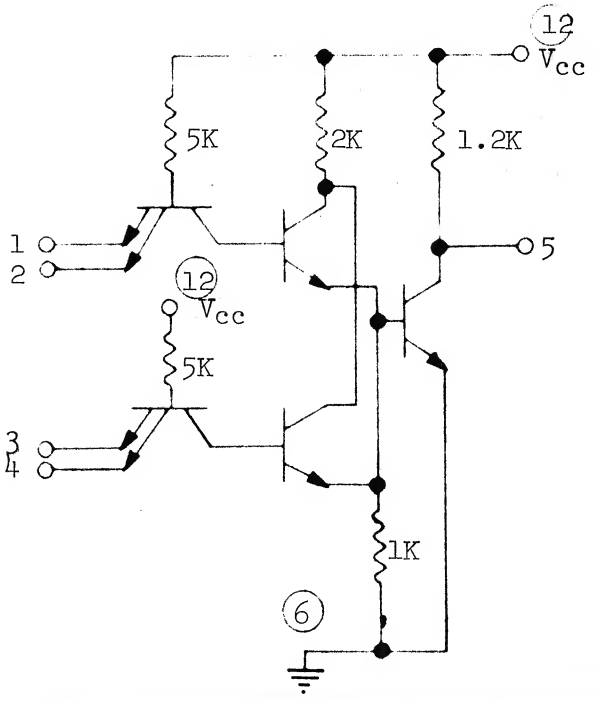
The SN676 is a dual TTL Exclusive OR gate with low propagation delay and high noise immunity designed to operate over the full military temperature range of -55°C to +125°C. The SN676 is fabricated using diffused planar epitaxial techniques.

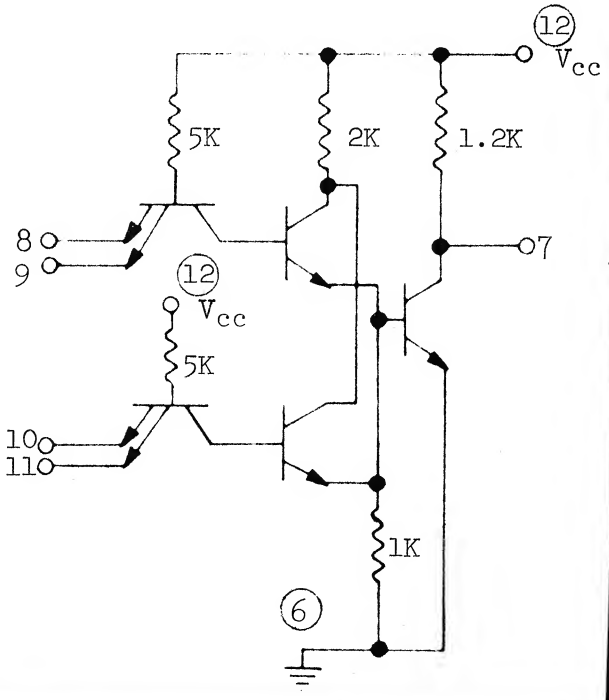
LOGIC DIAGRAMS



	Positive	Negative
5	$\overline{(1)(2)+(3)(4)}$	$\overline{(1+2)(3+4)}$
7	$\overline{(8)(9)+(10)(11)}$	$\overline{(8+9)(10+11)}$

NETWORK CIRCUIT DIAGRAMS





Preliminary Specifications

NETWORK CHARACTERISTICS

Absolute Maximum Ratings:

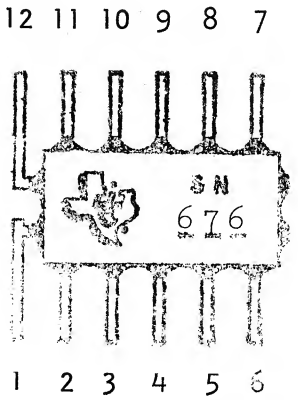
Supply Voltage	8 volts
Input Voltage	6 volts
Output Voltage	8 volts
Power Dissipation	200 mw
Operating Temperature	-55°C to +125°C

Network Electrical Characteristics

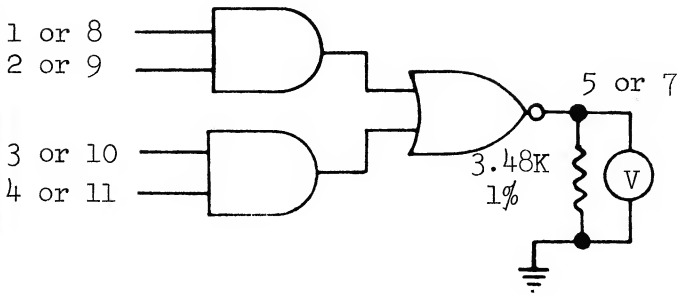
Network Parameters											MIN	MAX	UNIT
Operating Supply Voltage											4.0	5.0	v
Fan-Out: Each Output Paralleled Output												7 5	
Off Voltage	PIN	1	2	3	4	8	9	10	11				
V_{cc} = 4.0 volts	5	0.8	4.5	0.8	4.5	-	-	-	-		2.3		v
Temperature +125°C	5	4.5	0.8	0.8	4.5	-	-	-	-		2.3		v
(See Figure 1)	5	0.8	4.5	4.5	0.8	-	-	-	-		2.3		v
	5	4.5	0.8	4.5	0.8	-	-	-	-		2.3		v
	7	-	-	-	-	0.8	4.5	0.8	4.5		2.3		v
	7	-	-	-	-	4.5	0.8	0.8	4.5		2.3		v
	7	-	-	-	-	0.8	4.5	4.5	0.8		2.3		v
	7	-	-	-	-	4.5	0.8	4.5	0.8		2.3		v
Saturation Voltage	PIN	1	2	3	4	8	9	10	11				
V_{cc} = 4.0 volts	5	0	-	2.0	2.0	-	-	-	-			0.5	v
(See Figure 3) +125°C	5	2.0	2.0	0	-	-	-	-	-			0.5	v
	7	-	-	-	-	0	-	2.0	2.0			0.5	v
	7	-	-	-	-	2.0	2.0	0	-			0.5	v
-55°C	5	0	-	2.0	2.0	-	-	-	-			0.5	v
	5	2.0	2.0	0	-	-	-	-	-			0.5	v
	7	-	-	-	-	0	-	2.0	2.0			0.5	v
	7	-	-	-	-	2.0	2.0	0	-			0.5	v
Input Short Current	PIN	1	2	3	4	8	9	10	11				
V_{cc} = 4.5 volts	1	0	4.5	-	-	-	-	-	-			1.2	ma
Temperature +125°C	3	-	-	0	4.5	-	-	-	-			1.2	ma
(See Figure 2)	8	-	-	-	-	0	4.5	-	-			1.2	ma
	10	-	-	-	-	-	-	0	4.5			1.2	ma
Noise Immunity											300		mv

Preliminary Specifications

NETWORK PARAMETERS										MIN	MAX	UNIT
Output Short Current (See Figure 4)	PIN	1	2	3	4	8	9	10	11			
+125°C, V_{cc} = 4.5 v	5	0	0	0	0	-	-	-	-		4.0	ma
	7	-	-	-	-	0	0	0	0		4.0	ma
-55°C	5	0	0	0	0	-	-	-	-	2.5		ma
	7	-	-	-	-	0	0	0	0	2.5		ma
Input Leakage Current	PIN	1	2	3	4	8	9	10	11			
Temperature +125°C, V_{cc} = 4.5 v (See Figure 5)	1	4.5	0	-	-	-	-	-	-		100	µa
	2	0	4.5	-	-	-	-	-	-		100	µa
	3	-	-	4.5	0	-	-	-	-		100	µa
	4	-	-	0	4.5	-	-	-	-		100	µa
	8	-	-	-	-	4.5	0	-	-		100	µa
	9	-	-	-	-	0	4.5	-	-		100	µa
	10	-	-	-	-	-	-	4.5	0		100	µa
	11	-	-	-	-	-	-	0	4.5		100	µa
On Current (from V_{cc}) V_{cc} = 5.0 v, Temperature +125°C	5.0 volts on all inputs; outputs open										20	ma
Off Current (from V_{cc}) V_{cc} = 5.0 v, Temperature +125°C	0 volts on all inputs; outputs open										8	ma
Leading Edge Delay ($\frac{T_+}{2}$)	PIN	1	2	3	4	8	9	10	11			
V_{cc} = 4.0 v, (See Figure 6) +125°C		⎍	4.0	0	-	pin 5	4.0	0	-		35	ns
-55°C		⎍	4.0	0	-	pin 5	4.0	0	-		35	ns
+125°C		0	-	⎍	4.0	0	-	pin 5	4.0		35	ns
-55°C		0	-	⎍	4.0	0	-	pin 5	4.0		35	ns
Trailing Edge Delay ($\frac{T_-}{2}$)	PIN	1	2	3	4	8	9	10	11			
V_{cc} = 4.0 v, (See Figure 6) +125°C		⎍	4.0	0	-	pin 5	4.0	0	-		35	ns
-55°C		⎍	4.0	0	-	pin 5	4.0	0	-		35	ns
+125°C		0	-	⎍	4.0	0	-	pin 5	4.0		35	ns
-55°C		0	-	⎍	4.0	0	-	pin 5	4.0		35	ns

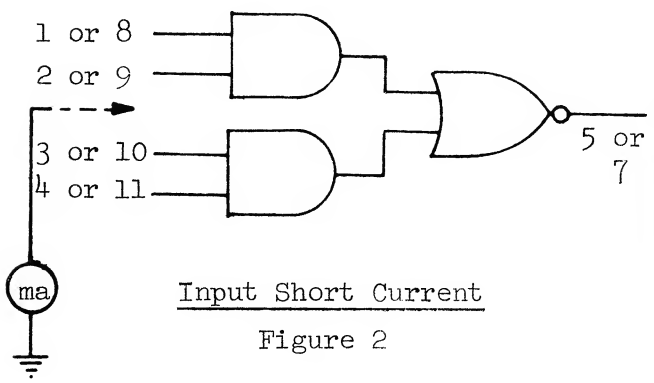


Package



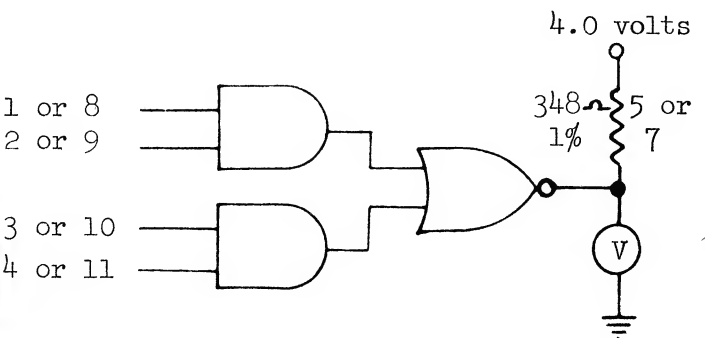
Off Voltage

Figure 1



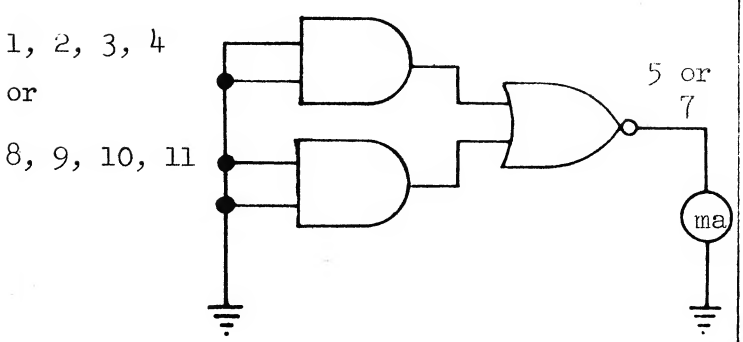
Input Short Current

Figure 2



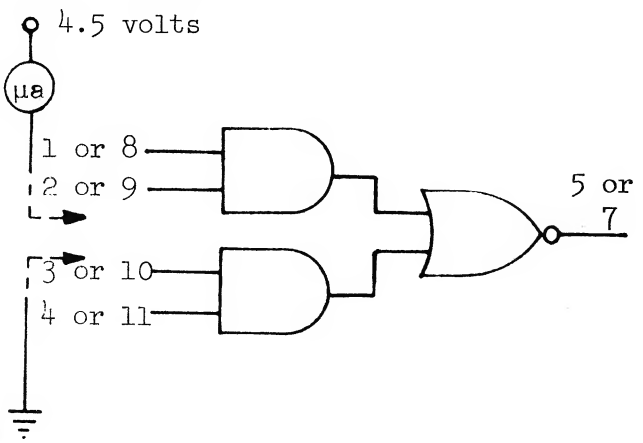
Saturation Voltage

Figure 3



Output Short Current

Figure 4



Input Leakage Current

Figure 5

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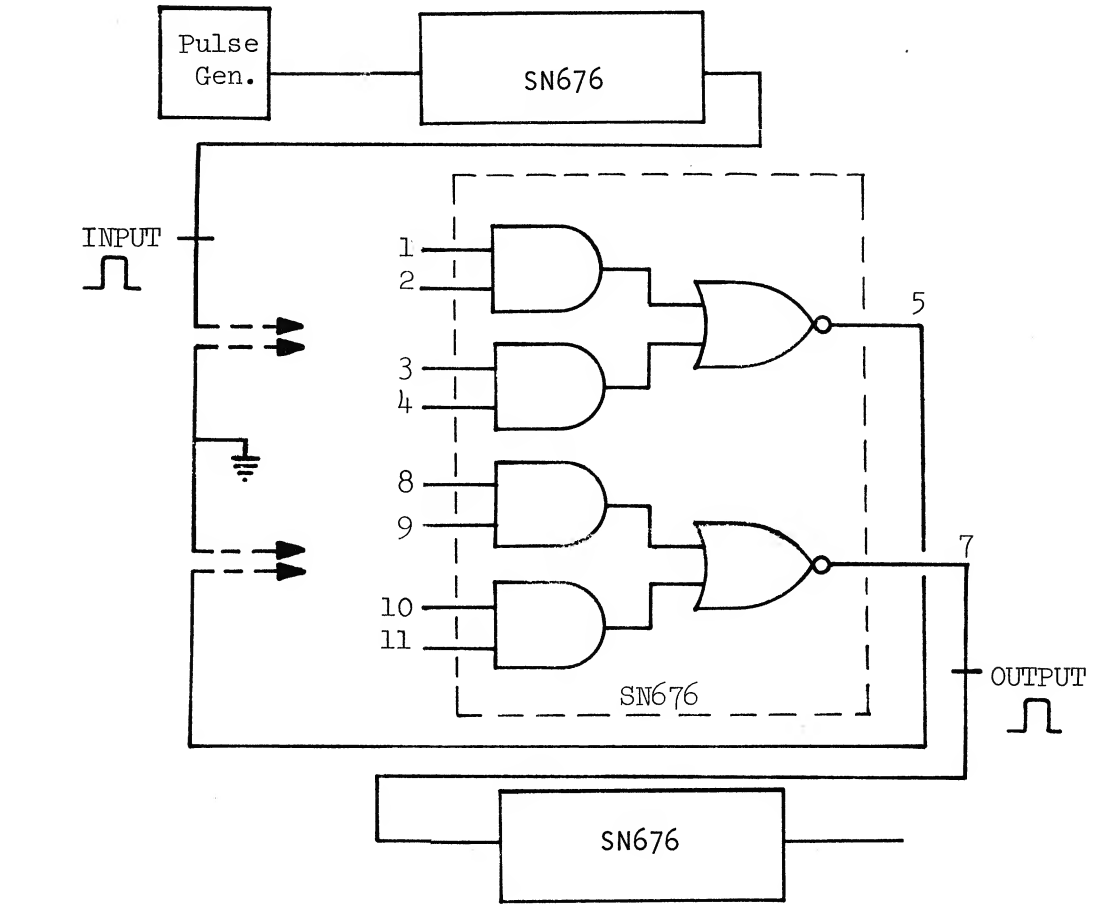
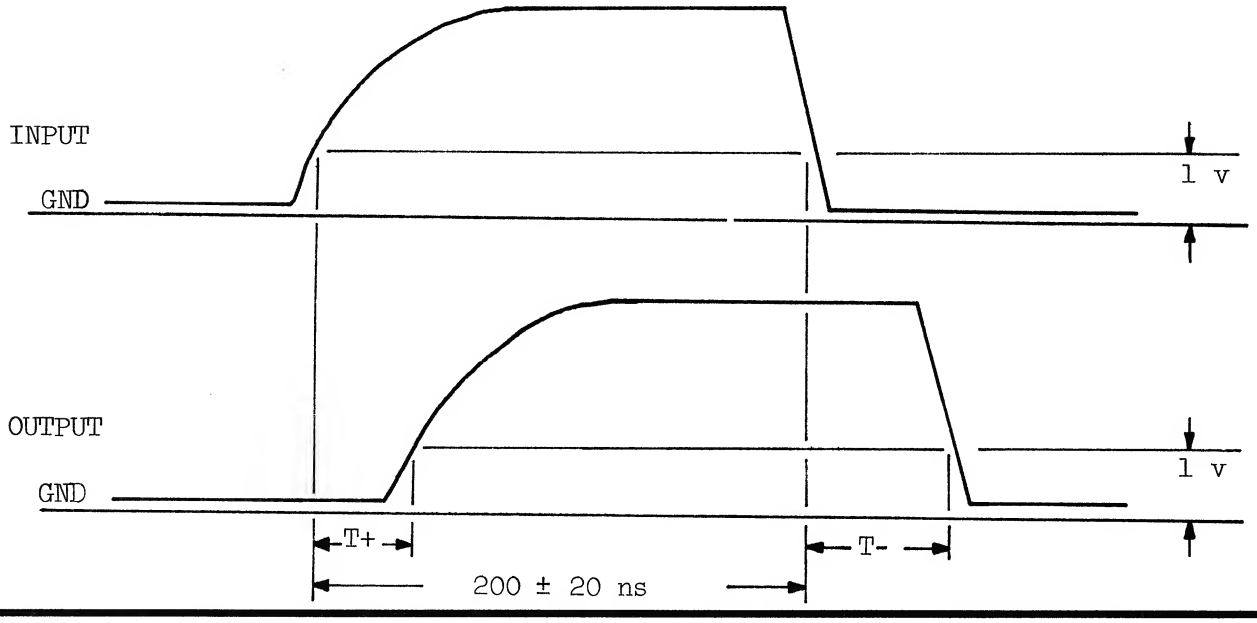
PROPAGATION DELAY

Figure 6



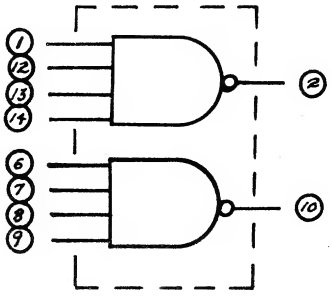


August 1964

Description

The SN742 is a dual, 4-input, TTL, positive NAND gate capable of driving large fan-out and high capacity loads over the full military temperature range of -55°C to +125°C. The SN742 is fabricated using diffused planar double epitaxial techniques.

Logic Diagram



Logic

Positive NAND:

$2 = \overline{(1)(12)(13)(14)}$

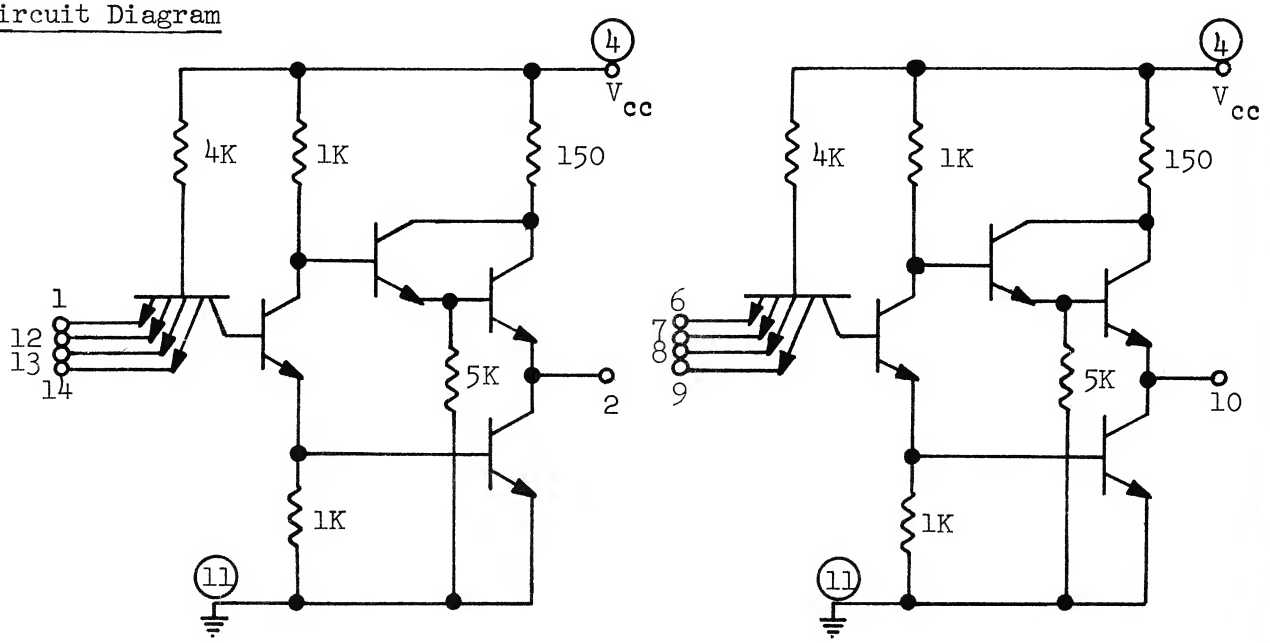
$10 = \overline{(6)(7)(8)(9)}$

Negative NOR:

$2 = \overline{1+12+13+14}$

$10 = \overline{6+7+8+9}$

Circuit Diagram



Typical Electrical Characteristics

Fan-out	15
Propagation Delay	25 ns
Noise Margin	600 mv
Power Dissipation	15 mw

PRELIMINARY SPECIFICATIONS

NETWORK CHARACTERISTICS

Absolute Maximum Ratings:

Supply Voltage	8 volts
Input Voltage	6 volts
Operating Ambient Temperature Range	-55°C to +125°C
Storage Temperature	-65°C to +150°C

All data applies for the following conditions unless otherwise noted:

Temperature: -55°C to +125°C
Fan-Out: 1 to 15
V_{cc} = 4.5 volts

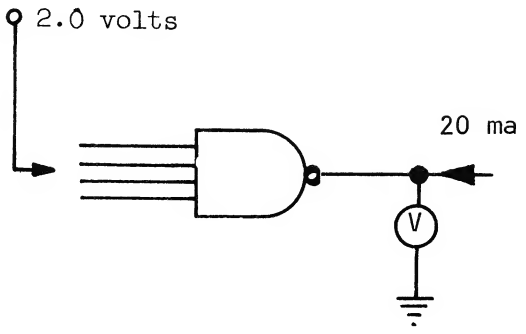
NETWORK PARAMETERS											MIN	MAX	UNIT
Operating Supply Voltage											4.5	5.5	v
Fan-Out											1	15	
Output ON Level	PIN	1	12	13	14	6	7	8	9				
+125°C	2	-	-	-	-	-	-	-	-			0.5	v
	10	-	-	-	-	-	-	-	-				
$I_{10} = I_2 = 20ma$ -55°C	2	2.0	2.0	2.0	2.0	-	-	-	-			0.5	v
(See Figure 1)	10	-	-	-	-	2.0	2.0	2.0	2.0			0.5	v
Output OFF Level	PIN	1	12	13	14	6	7	8	9				
	2	0.8	-	-	-	-	-	-	-		2.4		v
	2	-	0.8	-	-	-	-	-	-		2.4		v
$I_{10} = I_2 = -2ma$	2	-	-	0.8	-	-	-	-	-		2.4		v
(See Figure 2) +125°C	2	-	-	-	0.8	-	-	-	-		2.4		v
	10	-	-	-	-	0.8	-	-	-		2.4		v
	10	-	-	-	-	-	0.8	-	-		2.4		v
	10	-	-	-	-	-	-	0.8	-		2.4		v
	10	-	-	-	-	-	-	-	0.8		2.4		v
-55°C	2	0.8	-	-	-	-	-	-	-		2.4		v
	10	-	-	-	-	0.8	-	-	-		2.4		v
Noise Immunity (Output ON Level)											300		mv
(Output OFF Level)											400		mv
Input Current	PIN	1	12	13	14	6	7	8	9				
V_{cc} = 5.5 volts	12	4.5	0	4.5	4.5	-	-	-	-			-1.6	ma
	13	4.5	4.5	0	4.5	-	-	-	-			-1.6	ma
(See Figure 4)	7	-	-	-	-	4.5	0	4.5	4.5				
	8	-	-	-	-	4.5	4.5	0	4.5			-1.6	ma

NETWORK PARAMETERS										MIN	MAX	UNIT
Input Leakage Current	PIN	1	12	13	14	6	7	8	9			
	1	4.5	0	0	0	-	-	-	-		150	ua
V_{cc} = 5.5 volts	12	0	4.5	0	0	-	-	-	-		150	ua
(See Figure 3)	13	0	0	4.5	0	-	-	-	-		150	ua
	14	0	0	0	4.5	-	-	-	-		150	ua
	6	-	-	-	-	4.5	0	0	0		150	ua
	7	-	-	-	-	0	4.5	0	0		150	ua
	8	-	-	-	-	0	0	4.5	0		150	ua
	9	-	-	-	-	0	0	0	4.5		150	ua
	1	5.5	0	0	0	-	-	-	-		1.0	ma
	12	0	5.5	0	0	-	-	-	-		1.0	ma
	13	0	0	5.5	0	-	-	-	-		1.0	ma
	14	0	0	0	5.5	-	-	-	-		1.0	ma
	6	-	-	-	-	5.5	-	-	-		1.0	ma
	7	-	-	-	-	0	5.5	0	0		1.0	ma
	8	-	-	-	-	0	0	5.5	0		1.0	ma
	9	-	-	-	-	0	0	0	5.5		1.0	ma
Short Current (See Fig. 5)	PIN	1	12	13	14	6	7	8	9			
V_{cc} = 5.5 volts	2	0	-	-	-	-	-	-	-	-20	-45	ma
Pins 2 and 10 = 0 volts	10	-	-	-	-	0	-	-	-	-20	-45	ma
Power Drain (From V_{cc})	PIN	1	12	13	14	6	7	8	9			
V_{cc} = 5.5 volts	4	0	-	-	-	0	-	-	-		6	ma
	4	-	-	-	-	-	-	-	-		12	ma
Current (I_4) of Breakdown Voltage (V_{cc} = 8 volts) Pins 1 and 6 = 0 volts Temperature 25°C											12	ma

SWITCHING TIME		MIN	MAX	UNIT
Delay Time (t_d) (See Figure 7)	C = 100 pf		50	ns
Fan-Out = 15	C = 500 pf		80	ns
Rise Time (t_r) (See Figure 7)	C = 100 pf		45	ns
Fan-Out = 1 and 15	C = 500 pf		70	ns
Fall Time (t_f) (See Figure 7)	C = 100 pf		35	ns
Fan-Out = 15	C = 500 pf		50	ns
Storage Time (t_s) (See Figure 7)	C = 100 pf		65	ns
Fan-Out	C = 500 pf		100	ns

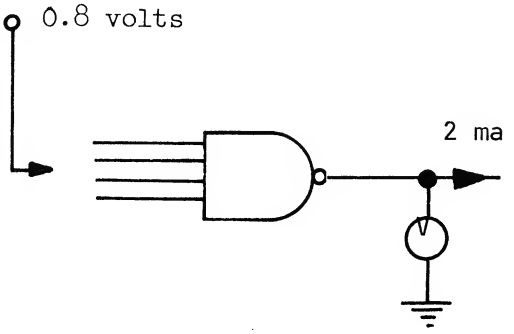
PRELIMINARY SPECIFICATIONS

SOLID CIRCUIT (R)
TYPE SN742
DUAL NAND GATE



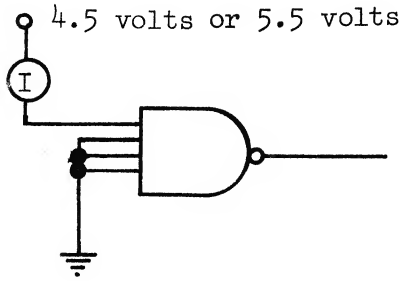
Output On Level

Fig. 1



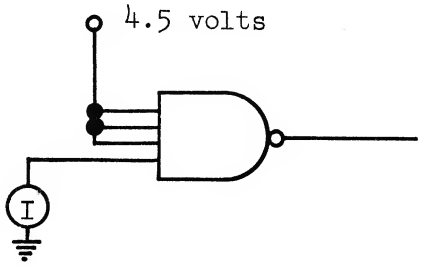
Output Off Level

Fig. 2



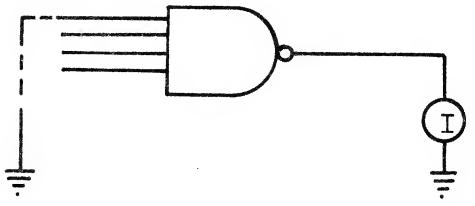
Input Leakage Current

Fig. 3



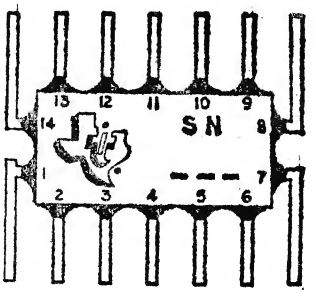
Input Current

Fig. 4



Short Current

Fig. 5



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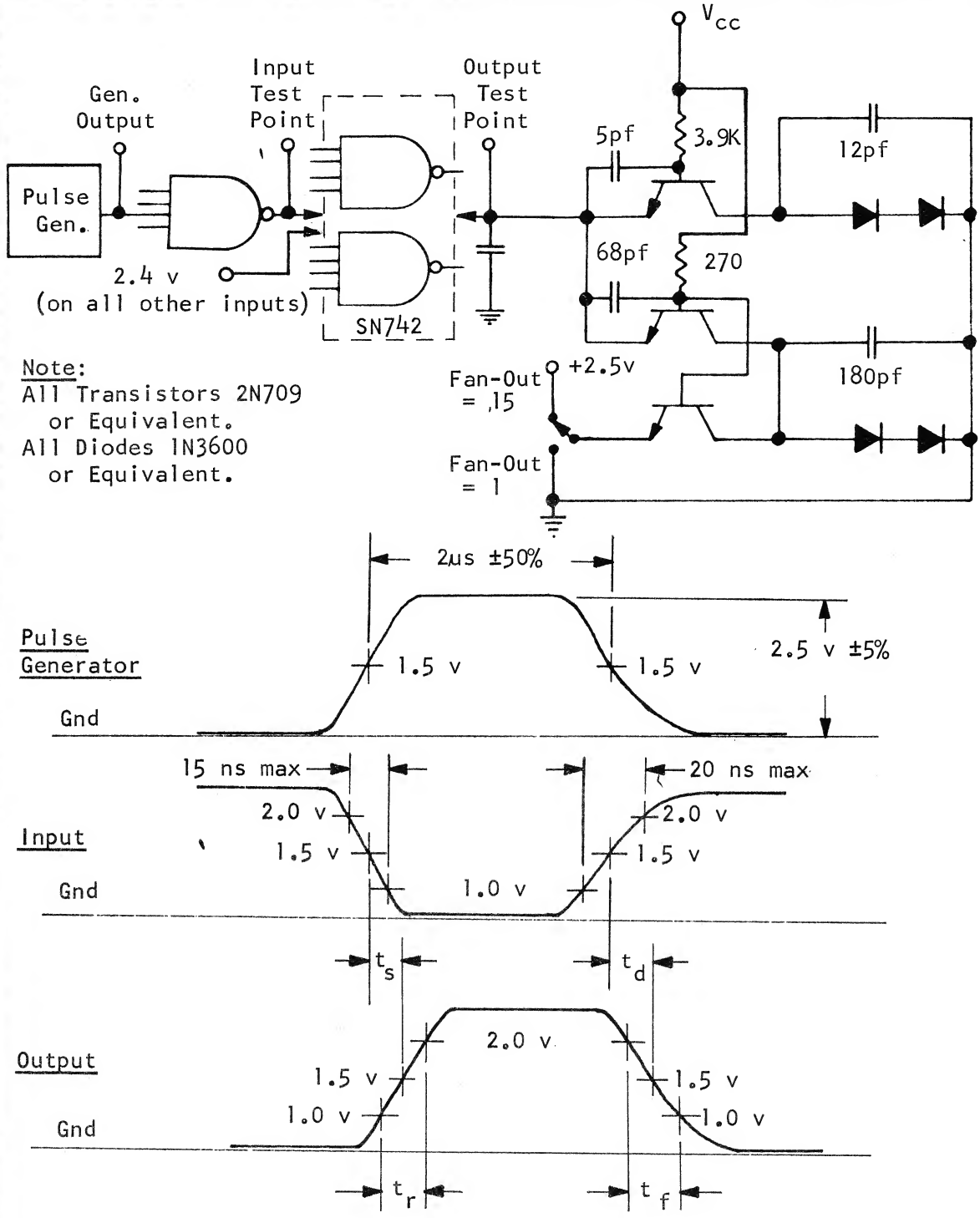


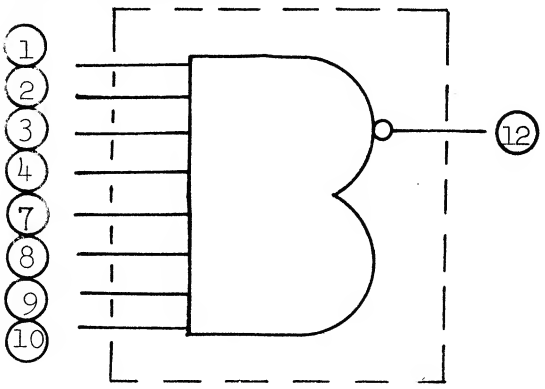
SWITCHING TIME
FIGURE 7

August 1964

DESCRIPTION

The SN743 is an 8-input, TTL, positive NAND gate capable of driving large fan-out and high capacity loads over the full military temperature range of -55°C to +125°C. The SN743 is fabricated using diffused planar double epitaxial techniques.

LOGIC DIAGRAM



LOGIC

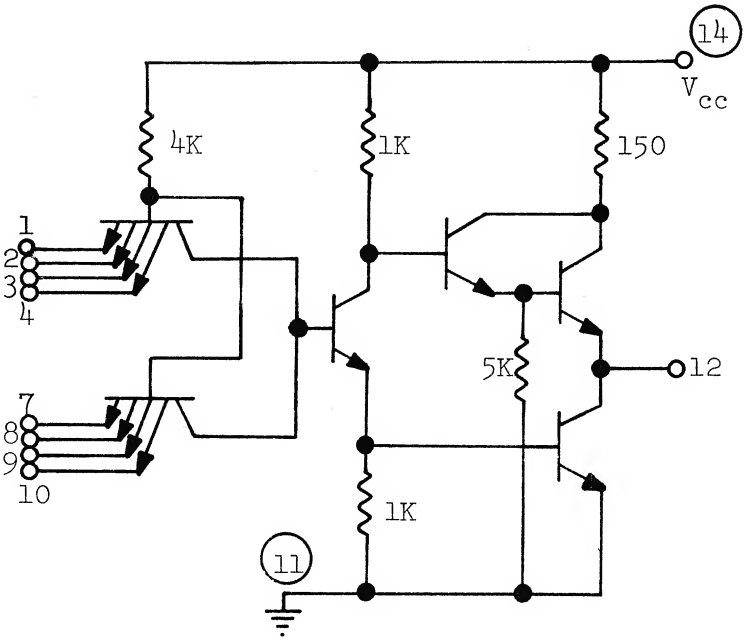
Positive NAND:

$$12 = \overline{(1)(2)(3)(4)(7)(8)(9)(10)}$$

Negative NOR:

$$12 = \overline{1+2+3+4+7+8+9+10}$$

CIRCUIT DIAGRAM



TYPICAL ELECTRICAL CHARACTERISTICS

Fan-out	15
Propagation	25 ns
Noise Margin	600 mv
Power Dissipation	15 mw

PRELIMINARY SPECIFICATIONS

NETWORK CHARACTERISTICS

Absolute Maximum Ratings:

Supply Voltage	8 volts
Input Voltage	6 volts
Operating Ambient Temperature Range	-55°C to +125°C
Storage Temperature	-65°C to +150°C

Network Electrical Characteristics

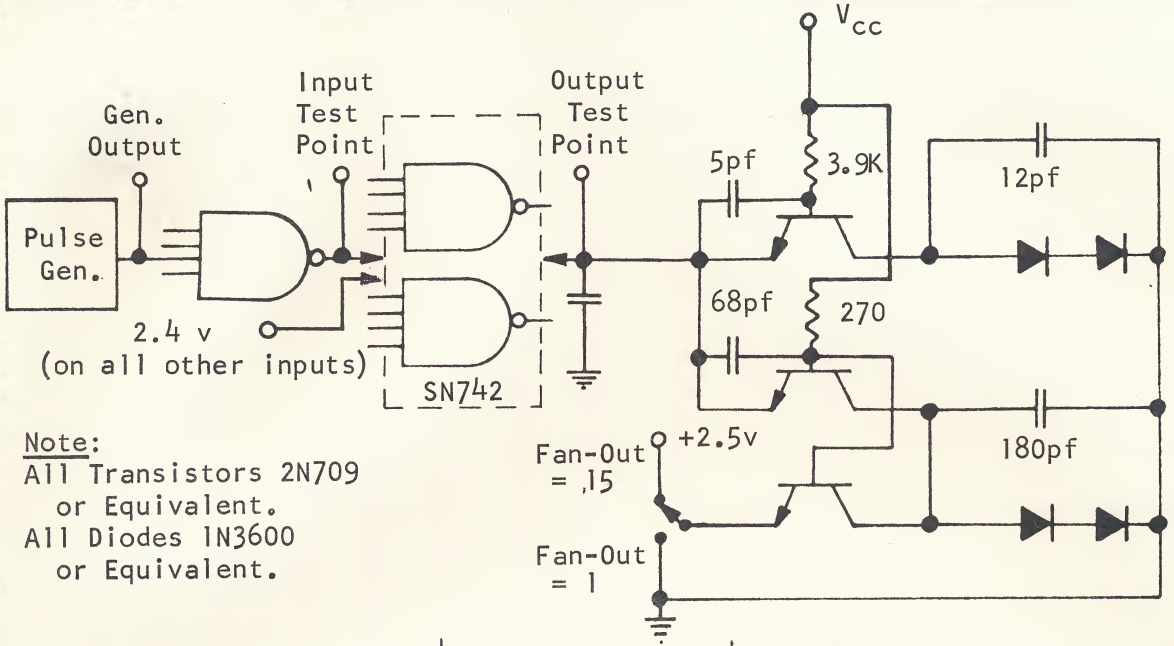
All data applies for the following conditions unless otherwise noted:

Temperature: -55°C to +125°C
Fan-Out: 1 to 15
V_{cc} = 4.5 volts

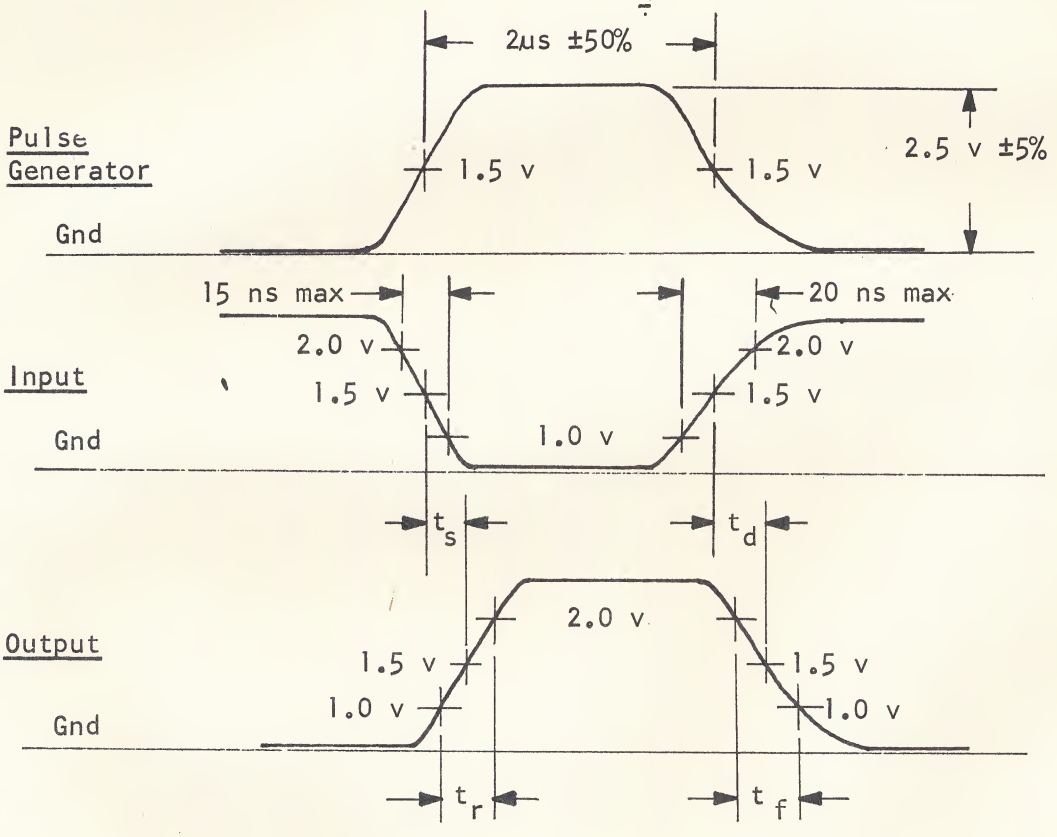
NETWORK PARAMETERS											MIN	MAX	UNIT
Operating Supply Voltage											4.5	5.5	v
Fan-Out											1	15	
Output ON Level (See Fig.1)	PIN	1	2	3	4	7	8	9	10				
V_{cc} = 4.5 v	+125°C	12	-	-	-	-	-	-	-	-		0.5	v
I_{12} = 20 ma	-55°C	12	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		0.5	v
Output OFF Level	PIN	1	2	3	4	7	8	9	10				
V_{cc} = 4.5 v		12	0.8	-	-	-	-	-	-	-	2.4		v
		12	-	0.8	-	-	-	-	-	-	2.4		v
I_{12} = -2 ma		12	-	-	0.8	-	-	-	-	-	2.4		v
	+125°C	12	-	-	-	0.8	-	-	-	-	2.4		v
(See Figure 2)		12	-	-	-	-	0.8	-	-	-	2.4		v
		12	-	-	-	-	-	0.8	-	-	2.4		v
		12	-	-	-	-	-	-	0.8	-	2.4		v
		12	-	-	-	-	-	-	-	0.8	2.4		v
	-55°C	12	0.8	-	-	-	-	-	-	-	2.4		v
Noise Immunity (Output ON Level)											300		mv
(Output OFF Level)											400		mv
Input Current	PIN	1	2	3	4	7	8	9	10				
(See Figure 4) V_{cc} = 5.5v		4	4.5	4.5	4.5	0	4.5	4.5	4.5	4.5		-1.6	ma
Short Current (See Fig.5)	PIN	1	2	3	4	7	8	9	10				
V_{cc}=5.5 v; Pin 12 = 0 v		12	0	-	-	-	-	-	-	-	-20	-45	ma

NETWORK PARAMETERS										MIN	MAX	UNIT
Input Leakage Current	PIN	1	12	13	14	6	7	8	9			
	1	4.5	0	0	0	-	-	-	-		150	ua
V_{cc} = 5.5 volts	12	0	4.5	0	0	-	-	-	-		150	ua
	13	0	0	4.5	0	-	-	-	-		150	ua
(See Figure 3)	14	0	0	0	4.5	-	-	-	-		150	ua
	6	-	-	-	-	4.5	0	0	0		150	ua
	7	-	-	-	-	0	4.5	0	0		150	ua
	8	-	-	-	-	0	0	4.5	0		150	ua
	9	-	-	-	-	0	0	0	4.5		150	ua
	1	5.5	0	0	0	-	-	-	-		1.0	ma
	12	0	5.5	0	0	-	-	-	-		1.0	ma
	13	0	0	5.5	0	-	-	-	-		1.0	ma
	14	0	0	0	5.5	-	-	-	-		1.0	ma
	6	-	-	-	-	5.5	-	-	-		1.0	ma
	7	-	-	-	-	0	5.5	0	0		1.0	ma
	8	-	-	-	-	0	0	5.5	0		1.0	ma
	9	-	-	-	-	0	0	0	5.5		1.0	ma
Short Current (See Fig. 5)	PIN	1	12	13	14	6	7	8	9			
V_{cc} = 5.5 volts	2	0	-	-	-	-	-	-	-	-20	-45	ma
Pins 2 and 10 = 0 volts	10	-	-	-	-	0	-	-	-	-20	-45	ma
Power Drain (From V_{cc})	PIN	1	12	13	14	6	7	8	9			
V_{cc} = 5.5 volts	4	0	-	-	-	0	-	-	-		6	ma
	4	-	-	-	-	-	-	-	-		12	ma
Current (I_4) of Breakdown Voltage (V_{cc} = 8 volts) Pins 1 and 6 = 0 volts Temperature 25°C											12	ma

SWITCHING TIME		MIN	MAX	UNIT
Delay Time (t_d) (See Figure 7)	C = 100 pf		50	ns
Fan-Out = 15	C = 500 pf		80	ns
Rise Time (t_r) (See Figure 7)	C = 100 pf		45	ns
Fan-Out = 1 and 15	C = 500 pf		70	ns
Fall Time (t_f) (See Figure 7)	C = 100 pf		35	ns
Fan-Out = 15	C = 500 pf		50	ns
Storage Time (t_s) (See Figure 7)	C = 100 pf		65	ns
Fan-Out	C = 500 pf		100	ns



Note:
All Transistors 2N709 or Equivalent.
All Diodes 1N3600 or Equivalent.



SWITCHING TIME
FIGURE 7